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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/643,537	08/18/2003	Seok-Hwan Hwang	793-US	4268

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EXAMINER	
GELLNER, JEFFREY L	

ART UNIT	PAPER NUMBER
3643	

DATE MAILED: 01/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/643,537	HWANG ET AL.	
	Examiner	Art Unit	
	Jeffrey L. Gellner	3643	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 November 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☒ Other: *See Continuation Sheet*.

Continuation of Attachment(s) 6). Other: translations of JP62-278922 and JP5-219834.

DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Objections

Claims 7, 15, and 19 are objected to because of the following informalities:

In claim 7, line 9 of text, "a" should be --an--.

Claim 15 appears to be a duplicate of claim 2.

Claim 19 appears to be a duplicate of claim 5.

Appropriate correction is required.

Claim Rejections - 35 USC §103

The following is a quotation of 35 U.S.C. §103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 2, 4, 5, 7, 8, 10, 11, and 13-20 are rejected under 35 U.S.C. §103(a) as being unpatentable over Keggins et al. (US 4,544,637) in view of JP62-278922.

As to claim 1, Keggins et al. discloses a method for treating whey (abstract) comprising the step of separating proteins (abstract) from a whey stock solution ("sweet whey" of abstract)

to make a medium ("mother liquid" or "liquid medium," for example, col. 3 lines 59-68, col. 5 lines 62-68, example 1 of col. 8), placing the solution in a reactor (from "inoculated and incubated" of col. 9 line 24), adjusting the medium to pH 3.8-6 (col. 9 lines 61-63) and growing an aerobic organism (Table 9 of col. 10). Not disclosed is the organism being mushroom mycelia and placing in a reactor at 25-32 C. JP62-278922, however, discloses using a whey medium in growing mycelia (abstract in English) and it is old and notoriously well known to grow mushrooms in a reactor at between 25 and 32 C (see for example, Femor (abstract only); Ibrahim et al. (abstract only) and Tang et al. (abstract) for growing mushrooms at temperatures between 25 and 32 C). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Keggins et al. by using with mushrooms as disclosed by JP62-278922 so as to use a medium which also uses discarded soybean lees so as recycle a waste product.

As to Claims 2 and 15, the limitations of Claim 1 are disclosed as described above. Not disclosed is the reactor set at 28.3 C and pH of 4.2. It would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the method of Keggins et al. as modified by JP62-278922 so as to optimize the reactor so as to achieve a particular growth rate with a particular mushroom species.

As to Claim 13, Keggins et al. as modified by JP62-278922 further disclose obtaining a whey stock solution (abstract) and adding appropriate amount of acid or base to precipitate the protein (abstract, col. 3 lines 32-42 of Keggins et al.).

As to Claim 14, Keggins et al. as modified by JP62-278922 further disclose inoculating the protein-free solution (from "inoculated and incubated" of col. 9 line 24)

As to Claim 16, the limitations of Claim 1 are disclosed as described above. Not disclosed is removing 90% of the organic substances in the protein-free solution. However, the culture would removing more than 90% of the organic substances in the supernatant depending upon population growth length. It would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the method of Keggins et al. as modified by JP62-278922 by growing the mushrooms a length of time to deplete 90% of the organics so as to efficiently use the medium.

As to claim 4, Keggins et al. discloses a method of culturing and organism (abstract) comprising the step of separating proteins (abstract) from a whey stock solution ("sweet whey" of abstract) to make a medium (for example, example 1 of col. 8), adjusting the medium to pH 3.8-6 (col. 9 lines 61-3), placing the solution in a reactor as a medium and placing the organism in the medium (from "inoculated and incubated" of col. 9 line 24) and growing an aerobic organism (Table 9 of col. 10). Not disclosed is the organism being mushroom mycelia and placing in a reactor at 25-32 C. JP62-278922, however, discloses using a whey medium in growing mycelia (abstract in English) and it is old and notoriously well known to grow mushrooms in a reactor at between 25 and 32 C (see for example, Femor (abstract only); Ibrahim et al. (abstract only) and Tang et al. (abstract) for growing mushrooms at temperatures between 25 and 32 C). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Keggins et al. by using with mushrooms as disclosed by JP62-278922 so as to use a medium which also uses discarded soybean lees so as recycle a waste product.

As to Claims 5 and 19, the limitations of Claim 4 are disclosed as described above. Not disclosed is the reactor set at 28.3 C and pH of 4.2. It would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the method of Keggins et al. as modified by JP62-278922 so as to optimize the reactor so as to achieve a particular growth rate with a particular mushroom species.

As to Claim 17, Keggins et al. as modified by JP62-278922 further disclose obtaining a whey stock solution (abstract) and adding appropriate amount of acid or base to precipitate the protein (abstract, col. 3 lines 32-42 of Keggins et al.).

As to Claim 18, Keggins et al. as modified by JP62-278922 further disclose inoculating the protein-free solution (from "inoculated and incubated" of col. 9 line 24)

As to Claim 20, the limitations of Claim 1 are disclosed as described above. Not disclosed is removing 90% of the organic substances in the protein-free solution. However, the culture would removing more than 90% of the organic substances in the supernatant depending upon population growth length. It would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the method of Keggins et al. as modified by JP62-278922 by growing the mushrooms a length of time to deplete 90% of the organics so as to efficiently use the medium.

As to claims 7 and 10, Keggins et al. discloses a method for treating whey (abstract) or culturing mushrooms comprising the step of obtaining whey stock solution (abstract); adding appropriate amount of acid or base to precipitate the protein (abstract, col. 3 lines 32-42); separating the proteins to obtain a supernatant ("mother liquid" or "liquid medium," for

example, col. 3 lines 59-68, col. 5 lines 62-68, example 1 of col. 8; separation at col. 3 lines 45-50); pasteurizing the supernatant (col. 3 lines 65-68); placing the supernatant in a reactor (from "inoculated and incubated" of col. 9 line 24); selecting an appropriate organism for optimal growth rates in the supernatant (example 3 of col. 9 lines 15-55); placing the organism in the supernatant inside the reactor (from "inoculated and incubated" of col. 9 line 24); inoculating the supernatant (from "inoculated and incubated" of col. 9 line 24); and, aerobically culturing an organism in the reactor (Table 9 of col. 10) at a pH 3.8-6 (col. 9 lines 61-63) Not disclosed is the organism being mushroom mycelia; placing in a reactor at 25-32 C; and, removing more than 90% of the organic substances in the supernatant. JP62-278922, however, discloses using a whey medium in growing mycelia (abstract in English); it is old and notoriously well known to grow mushrooms in a reactor at between 25 and 32 C (see for example, Femor (abstract only); Ibrahim et al. (abstract only) and Tang et al. (abstract) for growing mushrooms at temperatures between 25 and 32 C) and, the culture would removing more than 90% of the organic substances in the supernatant depending upon population growth length. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Keggins et al. by using with mushrooms as disclosed by JP62-278922 so as to use a medium which also uses discarded soybean lees so as recycle a waste product and to grow a length of time to deplete 90% of the organics so as to efficiently use the medium.

As to Claims 8 and 11, the limitations of Claim 7 and 10 are disclosed as described above. Not disclosed is the reactor set at 28.3 C and pH of 4.2. It would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the method of

Keggins et al. as modified by JP62-278922 so as to optimize the reactor so as to achieve a particular growth rate with a particular mushroom species.

Claims 3, 6, 9, and 12 are rejected under 35 U.S.C. §103(a) as being unpatentable over Keggins et al. (US 4,544,637) in view of JP62-278922 in further view of JP2000-201647.

As to Claim 3, the limitations of Claim 1 are disclosed as described above. Not disclosed is the mushroom being *G. lucidum*. JP2000-201647, however, discloses growing *G. lucidum* on a medium. It would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the method of Keggins et al. as modified by JP62-278922 by growing *G. lucidum* as disclosed by JP2000-201647 so as to have a useful foodstuff (see JP2000-201647 at abstract in English).

As to Claim 6, the limitations of Claim 4 are disclosed as described above. Not disclosed is the mushroom being *G. lucidum*. JP2000-201647, however, discloses growing *G. lucidum* on a medium. It would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the method of Keggins et al. as modified by JP62-278922 by growing *G. lucidum* as disclosed by JP2000-201647 so as to have a useful foodstuff (see JP2000-201647 at abstract in English).

As to Claim 9, the limitations of Claim 7 are disclosed as described above. Not disclosed is the mushroom being *G. lucidum*. JP2000-201647, however, discloses growing *G. lucidum* on a medium. It would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the method of Keggins et al. as modified by JP62-278922 by

growing *G. lucidum* as disclosed by JP2000-201647 so as to have a useful foodstuff (see JP2000-201647 at abstract in English).

As to Claim 12, the limitations of Claim 10 are disclosed as described above. Not disclosed is the mushroom being *G. lucidum*. JP2000-201647, however, discloses growing *G. lucidum* on a medium. It would have been obvious to one of ordinary skill in the art at the time of the invention to further modify the method of Keggins et al. as modified by JP62-278922 by growing *G. lucidum* as disclosed by JP2000-201647 so as to have a useful foodstuff (see JP2000-201647 at abstract in English).

Response to Arguments

Applicant's arguments filed 1 November 2004 have been fully considered but they are not persuasive. Applicant's arguments are: (1) Keggins et al. does not disclose or suggest that the optimum condition for culturing mushroom mycelia in whey is the temperature of 25 to 32 C with a pH of 3.8 to 4.6. (Remarks page 10, 1st complete para.); (2) JP62-278922 does not disclose or suggest that the optimum condition for culturing mushroom mycelia in whey is the temperature of 25 to 32 C with a pH of 3.8 to 4.6. (Remarks page 11, top incomplete para.); (3) Neither Keggins et al. nor JP62-278922, along or combined, teach removal and disposal of the organic substances (Remarks page 11, 2nd complete para.); (4) It is not old and notoriously well known to grown mushrooms in a reactor at between 25 and 32 C (Remarks page 11, last para.); (5) Keggins et al. does not disclose adjusting the medium to a pH of 3.8 to 4.6 because Keggins et al. raises the pH to 9 when precipitating the protein and only uses pH 4 to observe the

appearance of the medium (Remarks page 13 1st and 2nd para.); and, (6) the object of JP2000-201647 is different than the instant application (Remarks page 14, last para.).

As to arguments (1) and (2), Examiner agrees that Keggins et al. does not disclose an optimum condition for culturing mushroom mycelia in whey is the temperature of 25 to 32 C. Keggins et al. does disclose the use of a whey culturing medium at a pH of 3.8 to 4.6 (pH 4 or 4.5 at Table 8). JP62-278922 discloses culturing mycelia and it is know to use a temperature of 25 to 32 C to culture mushrooms (see for example, Femor (abstract only); Ibrahim et al. (abstract only) and Tang et al. (abstract) for growing mushrooms at temperatures between 25 and 32 C). With these references, Examiner considers it obvious to one of ordinary skill in the art to combine the references since all are in the general area of culturing of organisms.

As to argument (3), while none the references explicitly disclose the deposal of organic substances in the culturing medium, this result inherently follows when the medium is used over a length of time since the organism will use the organic substances during their growth.

As to argument (4), Examiner considers it old and notoriously well known to grow mushrooms in a reactor at between 25 and 32 C (see for example, Femor (abstract only); Ibrahim et al. (abstract only) and Tang et al. (abstract).

As to argument (5), although the embodiments of the Keggins et al. concentrate of media with greater pH values, it is settled law that "patents are relevant as prior art for all they contain" (see MPEP 2123 for citations). In Keggins et al. the value of pH 4 for the medium is disclosed and it is well known to adjust a culturing medium to the needed pH depending upon use.

As to augment (6) although JP2000-201647 has a different objective than the instant application, it is settled law that "patents are relevant as prior art for all they contain" (see MPEP 2123 for citations). JP2000-201647 discloses the culturing of *G. lucidum*.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

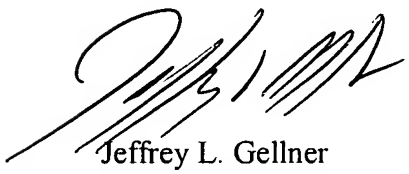
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Jeffrey L. Gellner whose phone number is 703.305.0053. The Examiner can normally be reached Monday through Thursday from 8:30 am to 4:00 pm. The Examiner can also be reached on alternate Fridays.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's Supervisor, Peter Poon, can be reached at 703.308.2574. The official fax telephone number for the Technology Center where this application or proceeding is assigned is 703.872.9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703.308.1113.



Jeffrey L. Gellner
Primary Examiner

THOMSON

MACHINE-ASSISTED TRANSLATION (MAT):

(19)【発行国】 日本国特許庁(JP)	**(19)[ISSUING COUNTRY]** Japan Patent Office (JP)
(12)【公報種別】 公開特許公報(A)	**(12)[GAZETTE CATEGORY]** Laid-open Kokai Patent (A)
(11)【公開番号】 特開平 5-219834	**(11)[KOKAI NUMBER]** Unexamined Japanese Patent Heisei 5-219834
(43)【公開日】 平成5年(1993)8月31日	**(43)[DATE OF FIRST PUBLICATION]** August 31, Heisei 5 (1993. 8.31)
(54)【発明の名称】 ディスポーサブル培養袋及び培養方法	**(54)[TITLE OF THE INVENTION]** Disposable culture bag and the culture method
(51)【国際特許分類第5版】 A01G 1/04 104 E	**(51)[IPC INT. CL. 5]** A01G 1/04 104 E
【審査請求】 未請求	**[REQUEST FOR EXAMINATION]** No
【請求項の数】 3	**[NUMBER OF CLAIMS]** 3
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(71)【出願人】	**(71)[PATENTEE/ASSIGNEE]**

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(57)【要約】
（修正有）

【目的】
温度調整された室内であれば特に除菌室を用いなくとも簡便に、高価なジャーファーメンターと同等の効果を奏し、且つ、ガラスのように割れるおそれもなく、融着

(57)[ABSTRACT OF THE DISCLOSURE]
(Amendments Included)

[PURPOSE]
In particular if it is chamber interior by which temperature control was carried out, even if it will not use microbe elimination chamber, it shows effect easily equivalent to expensive jar fermenter, and it can convey as it is only by

するのみでそのまま輸送が可能で、使用後は廃棄できるディスポーサブル培養袋を提供する。

【構成】

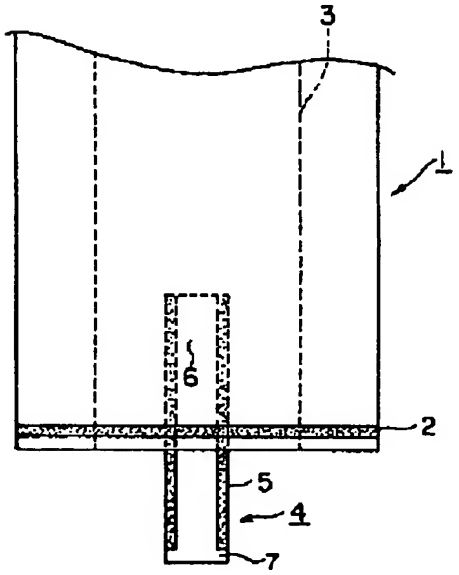
培養袋底部にプラスチックフィルムからなる扁平チューブ4を挿入し、該扁平チューブを内部貫通部位6を閉塞することなく培養袋底部に融着固定した培養袋並びに当該培養袋に、液状ないし半流動性、或いは粉粒状の培養基を充填し、脱気孔を残して袋口を密封し、袋口密封の前或いは後に、培地の滅菌を行い、袋底に設けた扁平チューブから通気を行う培養方法。

there being also no risk that it may be broken like glass, and fusing, and after usage provides destroyable disposable culture bag.

[CONSTITUTION]

It inserts flat tube 4 which consists of plastic film into culture bag-bottom part, into culture bag which carried out fusion immobilization of this flat tube at culture bag-bottom part without blockading internal penetration part 6, together with said culture bag

It is filled with liquid, semi-fluid, or particle-like culture medium, it leaves vent and seals bag opening, before bag-opening sealing or after, the culture method of performing sterilization of medium and performing gas-passage from flat tube provided in bag bottom.



【特許請求の範囲】

[CLAIMS]

【請求項1】
培養袋底部にプラスチックフィルムからなる扁平チューブを挿入し、該扁平チューブを内部貫通部位を閉塞することなく培養袋底部に融着固定したことを特徴とするディスポーサブル培養袋。

[CLAIM 1]
It inserts flat tube which consists of plastic film into culture bag-bottom part, it carried out fusion immobilization of this flat tube at culture bag-bottom part, without blockading internal penetration part.
Disposable culture bag characterized by the above-mentioned.

【請求項2】
扁平チューブに通気性フィルターを設けたことを特徴とする請求項第1項記載のディスポーサブル培養袋。

[CLAIM 2]
It provided air permeable filter in flat tube.
Disposable culture bag of Claim 1 characterized by the above-mentioned.

【請求項3】
培養袋底部にプラスチックフィルムからなる扁平チューブを挿入し、該扁平チューブを内部貫通部位を閉塞することなく培養袋底部に融着固定した培養袋に、液状ないし半流動性、或いは粉粒状の培養基を充填し、脱気孔を残して袋口を密封し、袋口密封の前或いは後に、培地の滅菌を行い、袋底に設けた扁平チューブから通気を行うことを特徴とする培養方法。

[CLAIM 3]
A culture method, which inserts flat tube which consists of plastic film into culture bag-bottom part, into culture bag which carried out fusion immobilization of this flat tube at culture bag-bottom part without blockading internal penetration part
It is filled with liquid, semi-fluid, or particle-like culture medium, it leaves vent and seals bag opening, before bag-opening sealing or after, it performs sterilization of medium and performs gas-passage from flat tube provided in bag bottom.

【発明の詳細な説明】

[DETAILED DESCRIPTION OF THE INVENTION]

【0001】

[0001]

【産業上の利用分野】
本発明は、茸菌、各種バクテリアなどの通気培養に際し、ジャーファーメンターに匹敵する効果を有すると共に、軽量で簡便、且つ輸送、取扱い容易なディスポーサブル培養袋及びこれを用いた培養方法に関する。

[INDUSTRIAL APPLICATION]
With this invention, while having effect which is equal to jar fermenter in the case of aeration culture, such as mushroom mycelium and various bacteria, it is lightweight and simple, and
It is an easily conveyed and handled and is an easy disposable culture bag, and it is related with the culture method using this.

【0002】

[0002]

【従来の技術】
従来の培養槽はガラスまたはステンレス製の容器が使用され、その容器は通気のためのスパージャー及び排気孔が最低限必要であり、その他撹拌機、サンプリング口などが設置されている。

[PRIOR ART]
As for conventional culture tank, glass or stainless steel vessel is used, sparger and exhaust hole of its container for gas-passage are need at least.
In addition, agitator, sampling mouth, etc. are installed.

【0003】
これら培養槽は小型のものは内容量1リットルから5リットル程度であり、通常ミニジャーファーメンターと呼ばれ、主としてガラス製である。内容量の大きいものはジャーファーメンターと呼ばれ、主としてステンレス製で内容量10リットルから200リットル程度であり、更に大型のものも使用されている。

[0003]
These culture tank
Small-sized things are 1 liter - 5 liter volume level.
It is usually called mini-jar fermenter, it is mainly glass-made.
Large thing of net weight is called jar fermenter, it is stainless steel and is mainly about 200 liter from 10 liter of net weight, furthermore, large sized thing is also used.

【0004】
小型のものは実験室レベルでのデータの集積や醗酵生産に多く使用され、一度に数台ないし10

[0004]
Many small-sized things to integration of data in laboratory level or fermentation production are used, it may use several sets or about ten sets

数台を使用することもあるが、一般に高価であるため、限られた範囲の実験に使用され、一部の研究者が利用できるのみであった。

at once.
However, since it is generally expensiveness, it is used for experiment of limited range, it was only that some researchers can utilize.

【0005】

[0005]

【発明が解決しようとする課題】
近時、空調機器の普及及び効率化により培養室などの温度制御が容易且つ精度高く行えるようになり、また、大型化されるに至った。このような室内に多数の同一系の培養袋を設置することにより効率よく培養できる環境が整うにしたがい、簡易な設備で培養効率が高く、培養物の移動、輸送が容易であり、使用後は廃棄できる培養容器及び培養方法が求められていた。

[PROBLEM TO BE SOLVED BY THE INVENTION]
Recently, propagation and increase in efficiency of air-conditioning-machine device can perform now temperature controls, such as culture room, easily and accurately, moreover, it came to extend.
As environment which can be efficiently cultivated by installing culture bag of many same types in such chamber interior is prepared, culture effectiveness is high at simple installation, and movement of culture and transportation are easy.
Discardable culture vessel after usage and culture method were sought after.

【0006】

[0006]

【課題解決の手段】
本発明は上記課題を解決することを目的とし、その構成は、培養袋底部にプラスチックフィルムからなる扁平チューブを挿入し、上記該チューブを内部貫通部位を閉塞することなく培養袋底部に融着固定した培養袋に、液状ないし半流動性、或いは粉粒状の培養基を充填し、脱気孔を残して袋口を密封し、袋口密封の前或いは後

[Means of business solution]
This invention aims at solving the above-mentioned problem, the configuration inserts flat tube which consists of plastic film into culture bag-bottom part, into culture bag which carried out fusion immobilization of the above-mentioned tube at culture bag-bottom part without blockading internal penetration part It is filled with liquid, half-fluidity, or particle-like culture medium, it leaves vent and seals bag opening, before bag-opening sealing or after, it

に、培地の滅菌を行い、袋底に設けた扁平チューブから通気を行うことを特徴とする。

is characterized by performing sterilization of medium and performing gas-passage from flat tube provided in bag bottom.

【0007】
本発明における培養袋の素材は、内容物の重量に耐え、且つ、125℃、30分以上の高圧滅菌に耐える透明なプラスチックフィルムであり、特にポリプロピレン、高密度ポリエチレンなどのポリオレフィン系素材が好ましい。また、扁平チューブの素材も培養袋素材と同様の素材が使用できる。

[0007]
Raw material of culture bag in this invention withstands weight of contents, and it is transparent plastic film which withstands degrees C and autoclaving for 30 minutes or more.
Polyolefin-type raw materials, such as polypropylene and high density polyethylene, are desirable in particular.
Moreover, raw material of flat tube can also use raw material similar to culture bag raw material.

【0008】
本発明の培養袋の形状は特に限定はなく、チューブ状の袋素材の両脇を折り込んだガセット袋、縦融着した筒状体或いはチューブ状フィルムを扁平に折りたたみ、横融着した袋、或いは縦融着した筒状体或いはチューブ状フィルムの一端を結紮した袋などが使用できる。中でもガセット袋は内容物を充填した場合に角形の袋底を形成するため内容物が安定し、好ましい形状である。

[0008]
Shape of culture bag of this invention does not have limitation in particular, gusset bag which inserted in both sides of tube-like bag raw material, it folds up flatly cylindrical body or tube like film which carried out vertical fusion, it can use bag which ligated end of bag which carried out horizontal fusion, cylindrical body which carried out vertical fusion, or tube like film.
Particularly, as for gusset bag, contents are stabilized in order to form square bag bottom, when filled with contents, it is desirable shape.

【0009】
培養袋の底部には扁平チューブを挿入し、内部貫通部を残して扁平チューブの両端を培養袋に融着固定する。挿入にあたっては、例えば、前もってフッソ樹脂やシリ

[0009]
It inserts flat tube in bottom part of culture bag, it leaves internal penetration part and carries out fusion immobilization of the ends of flat tube at culture bag.
In the insertion, for example, it draws out thin

コーン樹脂などの剥離性素材で表面処理した薄板を挿入した扁平チューブを、タテ融着部の袋底付近や底融着部に挿入して扁平チューブを融着固定すると同時に底融着或いはタテ融着を行った後薄板を引き抜き、内部貫通部を残す方法がある。

plate, after performing bottom fusion or length fusion at the same time it intercalates near bag bottom of length fusion part, and in bottom fusion part flat tube which intercalated thin plate beforehand surface-treated for removability raw materials, such as fluorine resin and silicone resin, and carries out fusion immobilization of the flat tube, there is method of leaving internal penetration part.

【0010】

本発明の培養袋の底部には扁平チューブを挿入し給気孔を形成する。扁平チューブは細いフィルムの両端を融着したものが一般的であるが、細いフィルムを縦に二つ折りし、一方の端部が融着され、他方の端部が折れ目線であるもの、更には全く融着部を有しない筒状体も、折れ目線部位を融着部と共に融着すれば使用できる。しかしながら、両端を融着した扁平チューブが好ましい。給気孔は袋内に少なくとも2cm、好ましくは3cm 以上の挿入部を設ける。

[0010]

It inserts flat tube in bottom part of culture bag of this invention, and forms air-supply hole.
As for flat tube, what fused ends of thin film is common.
However, it double-folds thin film perpendicularly, one end part is fused, also that whose end part of another side is crease line, and cylindrical body which further completely does not have fusion part, it can use it, if crease line part is fused with fusion part.
However, flat tube which fused ends is desirable.
Air-supply hole is at least 2 cm in bag, preferably it provides insertion part 3 cm or more.

【0011】

給気孔の先端は閉塞せずに開口していてもよいが、先端を閉塞して先端部近傍のフィルムに多数の小孔を穿設すると、給気が微細化して拡散し、給気効率が向上する。

[0011]

It may be carrying out opening of the front end of air-supply hole, without blockading.
However, if front end is blockaded and many small holes are pierced on film near the leading end part, air supply will micronize and diffuse, trapping efficiency improves.

【0012】

[0012]

給気孔の培養袋の外部に露出している部分の先端は、フィルム同士が密着して開き難いため、扁平チューブの培養袋の外に露出している部位の先端を融着せずに残すことが好ましい。或いは表面と裏面の長さを相違させたり、先端の切り口を鋸歯状にするなどの手段を講じることが好ましい。

Front end of part which it has exposed to exterior of culture bag of air-supply hole, in order for films not to contact and open, it is desirable to leave without fusing front end of part which it has exposed to outside of culture bag of flat tube.
Or it lets the length of surface and back-side differ.
Moreover, it is desirable to provide means, such as to make cut end at front end into saw-tooth.

【0013】
脱気孔としては、前もって培養袋の上部に1個または2個以上の扁平チューブを給気孔と同様の方法によって挿入固定すればよい。その位置は培地を充填すべき位置より上方であればよい。この脱気孔はサンプリング孔、或いは種菌注入孔としても使用できる。

[0013]
As vents, what is sufficient is just to carry out insertion immobilization of the 1, or 2 or more flat tube by method similar to air-supply hole beforehand at upper part of culture bag.
The location should just be upper direction from location which should be filled with medium.
It can use this vent also as sampling hole or a inoculum injected hole.

【0014】
或いは脱気孔を設けず、袋口を密封する際に脱気孔となるべき開口部を残して不完全融着することによっても達成される。融着線の開口部は、脱気に支障なく同時に外部からの雑菌の侵入を排除できるものであればよい。或いは袋上部に穿孔を設け、この穿孔をフィルター素材で被覆してもよい。

[0014]
Or it does not provide vent, when sealing bag opening, it is attained also by leaving and carrying out imperfect fusion of the vent which should constitute vent.
Vent of fusion line just eliminates encroachment of various micro-organisms from outside simultaneously convenient to deairing.
Or it may provide perforation in bag upper part, and may cover this perforation with filter raw material.

【0015】
脱気孔、給気孔或いはその両者にウレタンフォームなど連続気泡

[0015]
It supplies air which will not be eliminated microbes if filter members, such as continuous

性プラスチック発泡体や繊維集合体などのフィルター部材を挿入すれば除菌されない空気を供給したり、除菌されない室内で培養しても汚染を防ぐことができる。フィルター部材は疎水性素材であることが好ましい。

cellular plastic foams, such as urethane foam, and fiber assembly, are intercalated in vent, air-supply hole, or both, it can prevent contamination, even if it cultivates in chamber interior which is not eliminated microbes.
As for filter member, it is desirable that it is hydrophobic raw material.

【0016】

本発明に用いる培地は培養袋の底部から供給される空気が全体に配分される素材であることを要する。例えば液体培地、流動性の培地、半流動性の培地も使用できる。更に、固形培地であっても粒状の素材であれば、各粒子と粒子の間隙空間が連続して存在するため、この間隙を通過して供給空気を全体に配分することができる。

[0016]

Medium which it uses for this invention
It requires that it is raw material with which air supplied from bottom part of culture bag is distributed to whole.
For example, it can also use broth, fluid medium, and semi-fluid medium.
Furthermore, since spacing of each particle and particles exists continuously if it is grain shape raw material even if it is solid medium, it can pass through this space and can distribute supply air to whole.

【0017】

本発明の培養袋を用いて培養するには、培養袋に所定量の培地を充填する。脱気孔として扁平チューブを培養袋上部に装着してある場合には、そのまま袋口を完全密封し、扁平チューブにパイプを挿入し、脱気孔を確保して加熱滅菌を行う。冷却後植菌を行う。植菌は脱気孔を利用してもよく、また注射器状の器具を用いて行うこともできる。或いは滅菌は袋口を開いたまま行い、植菌後に培養袋口を融着してもよい。

[0017]

In order to cultivate using culture bag of this invention, it fills culture bag with medium of predetermined amount.
When culture bag upper part is equipped with flat tube as a vent, it carries out full sealing of the bag opening as it is, it inserts pipe in flat tube, it secures vent and performs heat sterilization.
It performs inoculation after cooling.
Inoculation may utilize vent and it can also perform it using syringe-like instrument.
Or it may perform sterilization, with bag opening opened, and it may fuse culture bag opening after inoculation.

【0018】
培養袋の上部に扁平チューブが設けられていない培養袋の場合には、脱気孔として袋口に融着されない開口部を残す。この場合、袋口融着部は袋口から少なくとも2.5cm、好ましくは3cm 以上離すことが好ましい。開口部の上部にフィルム素材が少ないと、培養中に開口部から雑菌が侵入しがちである。

[0018]
When it is culture bag with which flat tube is not provided in upper part of culture bag, it leaves vent which is not fused by bag opening as a vent.
In this case, bag-opening fusion part is at least 2.5 cm from bag opening, separating 3 cm or more preferably is desirable.
If film raw materials in upper part of vent is sparse, various micro-organisms tend to encroach from vent during culture.

【0019】
開口部を有する融着線を2本以上設け開口部の位置をずらせることもできる。この場合には融着線同士の間隔は少なくとも1.5cm、好ましくは2cm 以上離すことを要する。また、袋口を二重に折り込み、この折り込まれた部位を開口部を残して融着することも可能である。袋口の融着は滅菌前に行っても滅菌後に行ってもよいが、滅菌前に行う場合には植菌は注射器状の器具を用いて行う。

[0019]
It provides two or more fusion lines which have vent, and can also shift location of vent.
In this case, intervals of fusion lines is at least 1.5 cm, it requires separating 2 cm or more preferably.
Moreover, it inserts in bag opening doubly, and it can leave vent and can also fuse this part inserted in.
It may perform fusion of bag opening before sterilization, or it may carry out after sterilization.
However, when carrying out before sterilization, it performs inoculation using syringe-like instrument.

【0020】

[0020]

【作用】
本発明は培養槽として軽量なプラスチック袋を使用し、給気用のノズルとして同じくプラスチック製の扁平チューブを培養袋に融着す

[OPERATION]
This invention uses plastics bag lightweight as a culture tank, operation and transportation became easy while there was effect which is equal to jar fermenter by putting on chamber

ることにより、一定温度の室内に置くことにより、ジャーファーメンターに匹敵する効果を奏すると共に、操作、輸送が容易になった。扁平チューブは外力により開封しないと内容培地の圧力により閉塞し、培地がこぼれるおそれがなく、培養中には給気パイプを連結することにより充分な空気を供給することができる。

interior of constant temperature by fusing the flat tube same as a nozzle for air supplies made from plastic into culture bag.
If flat tube is not opened according to external force, it blockades it with pressure of content medium, there is no risk that medium may fall and it can supply sufficient air by connecting air-supply pipe during culture.

【0021】

[0021]

【実施例】
図1は本発明の1実施例の袋底部を示す平面図、図2は扁平チューブの袋本体との固定方法を示す断面図、図3は他の実施例の一部切欠を有する斜視図、図4は他の実施例の培養状態を示す斜視図である。

[EXAMPLES]
FIG. 1 is top view showing bag-bottom part of one Example of this invention, FIG. 2 is sectional drawing showing fixing method with main body of bag of flat tube, FIG. 3 is a perspective diagram which has partially notch of other Example, FIG. 4 is perspective diagram showing culture state of other Example.

【0022】
1は培養袋、2は底融着部、3はガセット折込み線である。底融着部2に扁平チューブ4を挿入固定し給気孔とした。底融着部2は、図2においては太線で表示した。5は2枚のフィルムを融着した融着部であり、本実施例においては両側に2本設け、中央部に内部貫通部位6を残した。7は給気孔の開口を容易にするため融着せずに残した非融着部である。

[0022]
1 is culture bag, 2 is bottom fusion part, 3 is gusset insertion line.
It carried out intercalation immobilization of the flat tube 4, and considered it as air-supply hole at bottom fusion part 2.
In FIG. 2, it displayed bottom fusion part 2 as thick line.
5 is fusion part which fused film of two sheets.
In this Example, it provides two at both sides, it left internal penetration part 6 to center section.
7 is non-fusing part which it did not fuse, but was and left in order to make opening of air-supply hole easy.

【0023】
図2における8は扁平チューブと袋フィルムとの融着部であり、扁平チューブ4を挿入して底融着を行えば4枚のフィルムが相互に融着するが、内部貫通部位6を設けるべき部位にテフロン皮膜を設けた薄板を挿入して融着を行ったため、薄板を引き抜いた後は内部貫通部位6が融着されずに残った。図2においては内部貫通部位6は閉塞しているが、内圧が加われば容易に開口する。

[0023]
8 in FIG. 2 is fusion part of flat tube and bag film.
If flat tube 4 is inserted and bottom fusion is performed, film of 4 sheet will fuse mutually.
However, since thin plate which provided Teflon film in part in which it should provide internal penetration part 6 was intercalated and fusion was performed, after drawing out thin plate, it remained, without fusing internal penetration part 6.
In FIG. 2, it blockades internal penetration part 6.
However, if internal pressure is added, it will carry out opening easily.

【0024】
図3においては、培養袋1の底部に設けた扁平チューブ4の一方の側縁にのみ融着部5を設け、培養袋内部の先端9を閉塞した。先端9近傍に多数の小孔10を穿設した。給気孔である扁平チューブ4から供給される空気は小孔10から微細な気泡となって上昇した。

[0024]
In FIG. 3, it provided fusion part 5 only in one side edge of flat tube 4 provided in bottom part of culture bag 1, and blockaded front end 9 inside culture bag.
It pierced many small holes 10 near the front-end 9.
Air supplied from flat tube 4 which is air-supply hole became fine bubble from small hole 10, and went up.

【0025】
11は脱気孔であり、図1に示した扁平チューブとほぼ同様の部材をタテ融着部12の上方に融着した。この場合には培地を充填し、上部を融着し、滅菌した後に脱気孔11から菌を接種し、次いで扁平チューブ4から給気を行い脱気孔11から脱気しつつ培養を行うこ

[0025]
11 is vent.
It fused flat tube shown in FIG. 1, and nearly identical member above length fusion part 12.
In this case, it is filled with medium, it fuses upper part, after sterilizing, it vaccinates microbe from vent 11, subsequently, it performed air supply from flat tube 4, and it was able to perform culture, degassing from vent 11.

とができた。しかも培養後はこぼれることなくそのまま輸送することができた。更に扁平チューブの外部に露出している部位を融着すれば一層確実に輸送できる。

And it was able to convey after culture as it was, without spilling.
Furthermore, if part which it has exposed to exterior of flat tube is fused, it can convey much more reliably.

【0026】

図4は上部に脱気孔11を設けない以外は図3とほぼ同様の培養袋の斜視図である。扁平チューブ4から供給される空気を排出するため、或いは培地を充填後、滅菌する際に発生する水蒸気を排出するための脱気孔を設ける必要がある。脱気孔として、袋口融着の際に一部を開口部として残して融着した。

[0026]

FIG. 4 is perspective diagram of FIG. 3 and nearly identical culture bag except not providing vent 11 in upper part.
In order to discharge air supplied from flat tube 4, it is necessary to provide vent for discharging water vapor generated after being filled with medium when sterilizing.
As a vent, on the occasion of bag-opening fusion, it left part as a vent and fused it.

【0027】

図4における13、14は融着線であり、約2cm 間隔で2本設け、開口部15、16をずらせた位置に設けた。融着線14から袋口までの距離は約5cm であった。培養袋内の空気は開口部15、2本の融着線間の間隙17及び開口部16を通過して培養袋外部に排出される。内圧が低下した場合には表裏の2枚のフィルム同士が密着して空気の通過を遮断し、雑菌の侵入を排除した。

[0027]

13 in FIG. 4 and 14 are fusion lines.
It provided two at intervals of about 2 cm, and provided in location which was able to shift vents 15 and 16.
Distance from fusion line 14 to bag opening was about 5 cm.
Air in culture bag passes space 17 and vent 16 of fusion line of 15 or 2 vents, and is discharged by culture bag exterior.
When internal pressure falls, films of two sheets of front and back contact, and it interrupts passage of air, it eliminated encroachment of various micro-organisms.

【0028】

実施例1

厚さ60μのポリプロピレン製で図

[0028]

Example 1

It injected medium of the following formula into

3に示す形状の培養袋1に下記処方の培地を注入した。
ミキサー処理じゃがいも 400g
グルコース 60g
イーストエキストラクト 6g
マルトエキストラクト 6g
蒸留水 1000ml
pH 5.5

culture bag 1 of shape shown in FIG. 3 by product made from polypropylene of thickness 60 micron.
Mixer treated potato 400g
Glucose 60g
Yeast extract 6g
Malto extract 6g
Distilled water 1000 ml
PH 5.5

【0029】
袋口を融着し、脱気孔11にグラスウールを挿入して120℃で20分間殺菌した。発生する水蒸気は脱気孔11から破袋することなく順調に排出された。冷却後、予め準備培養しておいた舞茸の種菌20gを脱気孔11から接種し、室温24℃の室内にて底部に設けた扁平チューブ4から除菌空気を約2000ml／分の割合で供給して培養した。

[0029]
It fuses bag opening, it inserted glass wool in vent 11, and sterilized for 20 minutes at 120 degrees C.
Generated water vapor was discharged favorably, without carrying out bag tearing from vent 11.
It vaccinates after cooling 20g of inoculum of maitake mushroom which carried out preliminary culture beforehand from vent 11, it supplied and cultivated microbe elimination air at ratio of about 2000 ml/min from flat tube 4 provided in bottom part in chamber interior with a room temperature of 24 degrees C.

【0030】
7日間ないし10日間で菌糸の成長は一定となり、この培養物はオガ粉を用いる舞茸栽培用の種菌として使用可能となった。しかも、この種菌は輸送、流通に際しても、このまま輸送することが可能で

[0030]
In seven days or in ten days make that the growth of hypha is fixed, it has used this culture as an inoculum for maitake-mushroom cultivation which uses sawdust.
And this spawn conveys, in the case of circulation

あり、液状種菌として茸栽培者に提供可能となった。

As it is, it can convey, as liquid inoculum, mushroom is provided for grower.

【0031】
通常、オガ粉培養種菌は接種後30日間の培養期間を必要とするが、本発明の方法によれば7日ないし10日できわめて効率よく培養でき、しかもガラス製の容器と異なり、破損のおそれがなく輸送が容易であった。

[0031]
Usually, sawdust culture inoculum needs incubation period for after vaccination 30 days.
However, according to the method of this invention, it can cultivate very efficiently in seven days or ten days, and, moreover, differs from glass-made vessel, there was no fear of breakage and transportation was easy.

【0032】
実施例2
広葉樹オガ粉　8リットル
フスマ　1リットル
水分　65%
上記処方の培地2.5kgを図4に示す培養袋に充填し、図4に示すように袋口を融着し、120℃で60分間殺菌した。冷却後、舞茸種菌10gを接種し、24℃の室内にて除菌空気を約50ml／分の割合で供給して培養した。

[0032]
Example 2
Broad-leaved-tree sawdust　8 liter
Wheat bran　1 liter
Water component　65%
It fills with the 2.5 kg above-mentioned medium of formula culture bag shown in FIG. 4, as shown in FIG. 4, it fuses bag opening, it sterilized for 60 minutes at 120 degrees C.
It vaccinates 10g of maitake-mushroom inoculum after cooling, it supplied and cultivated microbe elimination air at ratio of about 50 ml/min in 24-degree C chamber interior.

【0033】
約20日後、培地全体に菌糸が蔓延した後、室温18℃の発生室に移動した。通算30～35日で400～550gの子実体が得られた。一方、従来の方法によれば、舞茸の収穫には通算45～75日を要する。

[0033]
After about 20 day, after hypha spread in the whole medium, it transfered to development chamber which is room temperature of 18 degrees C.
400 - 550g fruiting body was obtained in total 30-35 days.
On the other hand, according to conventional method, harvest of maitake mushroom takes total 45-75 days.

【0034】

【発明の効果】
本発明のディスポーサブル培養袋を用いると、温度調整された室内であれば特に除菌室を用いなくとも簡便な方法で、高価なジャーファーメンターと同等の効果を得ることができる。しかも、割れるおそれもなく、融着するのみでそのまま輸送が可能であり、使用後は廃棄でき、流通上の利点も大きい。

【図面の簡単な説明】

【図1】
図1は本発明の1実施例の袋底部を示す平面図である。

【図2】
図2は扁平チューブの袋本体との固定方法を示す断面図である。

【図3】
図3は他の実施例の一部切欠を有する斜視図である。

【図4】
図4は他の実施例の培養状態を示す斜視図である。

【符号の説明】
1　培養袋

[0034]

[ADVANTAGE OF THE INVENTION]
In particular if it is chamber interior by which temperature control was carried out when disposable culture bag of this invention is used, even if it will not use microbe elimination chamber, it can acquire effect equivalent to expensive jar fermenter by simple method.
And there is also no risk that it may be broken, transportation is possible as it is only by fusing, it can discard after usage and its advantage on circulation is also large.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[FIG. 1]
FIG. 1 is top view showing bag-bottom part of one Example of this invention.

[FIG. 2]
FIG. 2 is sectional drawing showing fixing method with main body of bag of flat tube.

[FIG. 3]
FIG. 3 is a perspective diagram which has partially notch of other Example.

[FIG. 4]
FIG. 4 is perspective diagram showing culture state of other Example.

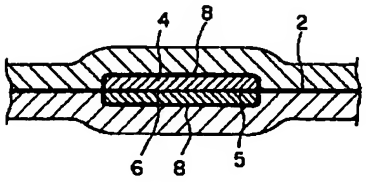
[DESCRIPTION OF SYMBOLS]
1　Culture bag

2　底融着部
3　ガセット折込み線
4　扁平チューブ
5　融着部
6　内部貫通部位
7　非融着部
8　扁平チューブと袋フィルムとの融着部
9　先端
10　小孔
11　脱気孔
12　タテ融着部
13、14　融着線
15、16　開口部
17　間隙

2　Bottom fusion part
3　Gusset insertion line
4　Flat tube
5　Fusion part
6　Internal penetration part
7　Non-fusing part
8　Fusion part of flat tube and bag film
9　Front end
10　Small hole
11　Vent
12　Length fusion part
13 14　Fusion line
15 16　Vent
17　Space

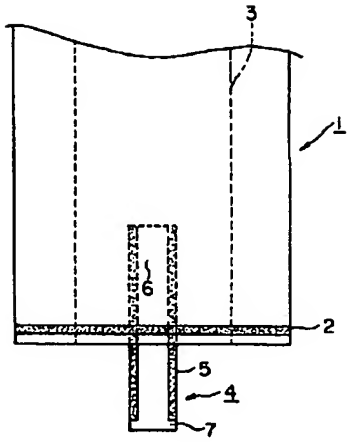
【図2】

[FIG. 2]



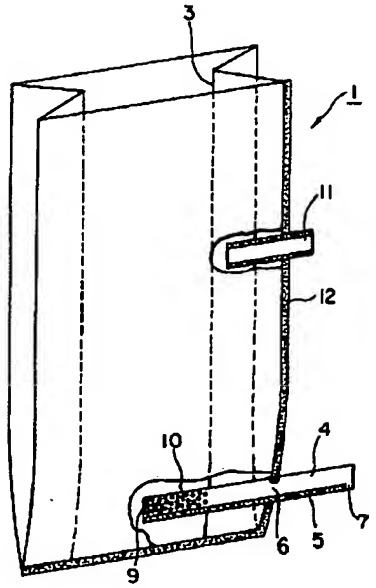
【図1】

[FIG. 1]

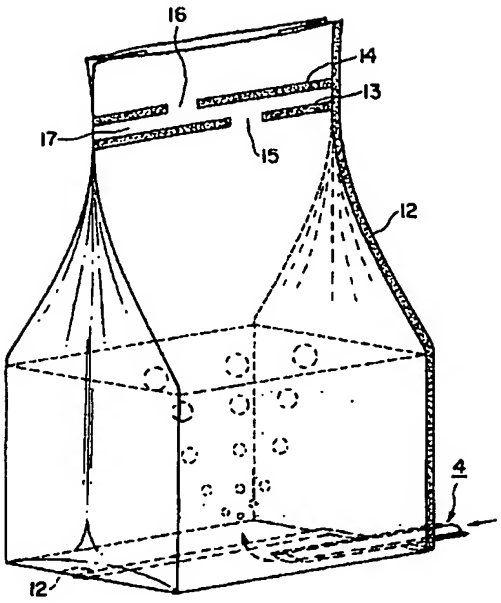


【図3】

[FIG. 3]



【図4】 [FIG. 4]



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Japanese Kokai Patent Application No.
Sho 62[1987]-278922

MEDIUM FOR CULTIVATION OF EDIBLE MUSHROOMS

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MEDIUM FOR CULTIVATION OF EDIBLE MUSHROOMS

[Shokuyokinokono saibaiyo baichi]

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[There are no amendments in this patent]

Claims

1. Medium for cultivation of edible mushrooms, characterized in that the medium contains 40 wt% or more, based on total solids in the medium, dehydrated bean curd waste obtained by adjusting the bean curd waste pH to 3.5-5.5 and press dehydrating and adjusting to a pH suitable for cultivation of mushrooms.

2. Medium for cultivation of edible mushrooms according to Claim 1, wherein the pH adjustment of the bean curd waste is carried out by using an acidic solution obtained by lactic acid fermentation of a whey solution formed in the bean curd production process.

3. Medium for cultivation of edible mushrooms according to Claim 1, wherein the pH adjustment of the bean curd waste is carried out by using an acidic solution obtained by lactic acid fermentation of a whey solution formed in the milk product manufacturing process.

4. Medium for cultivation of edible mushrooms according to Claim 1, wherein the pH adjustment of the bean curd waste is carried out by using an acidic solution comprising an organic acid and/or an inorganic acid.

5. Medium for cultivation of edible mushrooms according to Claims 1 to 4, wherein the water content of the bean curd waste is 65-85 wt%.

Detailed explanation of the invention

Application field of the invention

The present invention relates to a medium for cultivation of edible mushrooms.

Background of the invention

The method of utilizing a medium prepared by mixing sawdust and rice bran has been widely used for artificial cultivation of edible mushrooms until now.

In the conventional method utilizing the sawdust-rice bran medium, however, the following problems have been indicated. Namely, a large amount of sawdust to be mixed in the medium has been needed accompanied with active artificial cultivation on an industrial scale in recent years, but sawdust is generally obtained as a waste material from lumber and woodworking plants, etc. Therefore, the gathering and carrying of sawdust has become gradually more difficult as the demand has increased, leading to increase costs. Aside from this, in the case of cultivation using the aforementioned sawdust-rice bran mixed medium, the cultivation yield is low and the cultivation period becomes longer, and thus it production costs increase so that the advantage of artificial cultivation on an industrial scale is lost.

Commonly attempted solutions to the problems of effective utilization of waste from food plants have not related to the aforementioned matter. An example of these problems is the reutilization of bean curd waste (bean curd refuse) from the production of fresh bean curd, frozen bean curd, bean milk, etc. or the production of soy protein foods (separated soy protein, etc.). However, recently the reutilization of the aforementioned bean curd waste has faced a large problem because the demand as animal feed, a conventional utilization of for bean curd waste, has decreased and the quantity of supply from strained lees, etc. from the fermentation field for animal feed has increased. Further, the high water content of bean cured waste (typically 85%) raises transportation costs and makes its spoilage easy. Thus, in the summer of our country, it spoils after only 1 day, which is another problem for bean curd waste.

Thus, the utilization of bean curd waste as a medium for cultivation of edible mushrooms was considered in light of the aforementioned problems and the fact that bean curd waste has a relatively high content of nutrients used as medium ingredients, and the partial utilization of bean curd waste is actually being carried out. However, a large amount of chaff, etc. has to be added to adjust the water content to a suitable level in mediums for cultivation of edible mushrooms since the bean curd waste has a high water content as mentioned above; this lowers the utilization efficiency of nutrients in the bean curd waste and makes its advantage over the case of conventional sawdust-rice bran mixed mediums less attractive. Further, it has been considered to use the bean curd waste as the aforementioned medium ingredients after drying, but actual utilization has not occurred yet due to the high cost of drying.

Objective of the invention

The present invention was achieved in consideration of the aforementioned viewpoints, and its objective is to actually make possible the utilization of bean curd waste in mediums for cultivation of edible mushrooms as an effective use of bean curd waste and to realize efficient utilization of resources.

Further, another objective is to realize artificial cultivation of mushrooms at high yield by effectively utilizing the highly nutritive ingredients of bean curd waste.

Outline of the invention

The medium for cultivation of edible mushrooms of the present invention for realizing said objectives is characterized in that it contains 40 wt% or more, based on total solids in the medium, dehydrated bean curd waste obtained by adjusting the bean curd waste pH to 3.5-5.5 and press dehydrating and adjusting to a pH suitable for cultivation of mushrooms.

The edible mushrooms, for which the medium of the present invention is used, are not specifically restricted as long as they are appropriate for artificial cultivation, and the medium of the present invention is suitable especially for edible mushrooms such as agaricus, nameko, shiitake, etc.

As the bean curd waste in the present invention, that produced secondarily in the production of, for example, raw bean curd, frozen bean curd, bean milk, and the like or the production of soybean protein products (separated soybean protein, etc.) is utilized.

In the present invention, a press dehydration method, by which dehydration can be carried out at a low cost and high efficiency, is used for lowering the water content of the bean curd waste. However, the press dehydration is carried out after the bean curd waste is denatured by adjusting to pH 3.5-5.5 using an acidic solution since ordinary bean curd waste, as is, clogs the filter cloth, etc. of dehydration devices so that dehydration practically cannot be carried out.

The dehydration of bean curd waste is further improved if the pH is lowered to the range of 3.5-5.5. When the pH is below 3.5, a large amount of a neutralization agent is required in the subsequent pH adjustment to a medium for cultivation of edible mushrooms. Further, when the pH is higher than 5.5, the reduction of the water content by dehydration becomes insufficient or dehydration cannot be carried out.

As the acidic solution for pH adjustment of the aforementioned bean curd waste, organic acids such as lactic acid, citric acid, tartaric acid, malic acid, acetic acid, and the like, inorganic acids such as hydrochloric acid, phosphoric acid, and the like, or acidic solutions obtained by lactic acid fermentation of whey solutions produced in the bean curd production process or the production process of milk products (butter, cheese, etc.) are used, but when the acidic solutions obtained by lactic acid fermentation of whey solutions are used it is advantageous since the components in the whey solutions are utilized as nutrient ingredients of mediums for cultivation of edible mushrooms.

The aforementioned pH-adjusted bean curd waste is dehydrated by a press dehydration process utilizing a screw press, filter press, or the like to give dehydrated bean curd waste with a water content of about 60-80 wt%, preferably 65-75 wt%. The water content can be controlled by controlling the pressing force.

The dehydrated bean curd waste is adjusted to a pH suitable for cultivation of edible mushrooms and used as an edible mushroom medium directly or after adding necessary medium ingredients.

The adjustment to proper pH (generally pH 4.0-7.0) for cultivation of edible mushrooms is carried out by adding an alkali. The following alkalis can be used along or in combination of two or more. Namely, they are calcium carbonate, calcium hydroxide, calcium phosphate, calcium acetate, magnesium carbonate, etc.

In the present invention, the dehydrated bean curd waste can be used as is as a medium for edible mushrooms except for the pH adjustment, however suitable water content-controlling materials for controlling the water content of the medium may be added. As the water content-controlling materials, chaff is generally used for lowering the water content, and water is used for increasing the water content, but the water content-controlling materials are not limited to them.

One of special features of the medium for cultivation of edible mushrooms in the present invention is that the solids content in the dehydrated bean curd waste is 40 wt% or higher, preferably 50 wt% or higher, in terms of total solids in the medium even when suitable additives for adjustment of water content are added. When the solids content of the bean curd waste is less than 40 wt% of the total solids in the medium, the days cultivation of mushrooms cannot be

shortened and mushroom harvest is lowered so that the objective of the present invention cannot be sufficiently accomplished.

In the present invention, known additives for edible mushrooms may be used as mentioned above, and as such additives, for example, sawdust, rice straw, soybean husk, rice chaff, soy sauce cake, bean skins, starch, growth hormone, etc. can be exemplified.

The medium of the present invention can be used in the same way as conventionally mediums for cultivation of edible mushrooms. As an example, the medium containing the aforementioned dehydrated bean curd waste as a main component is put into a polypropylene container of a specified volume and sterilized in a sterilization kettle by wet heat after stoppering the container.

After cooling, the spores of edible mushroom are inoculated to the medium and cultivated at suitable temperature and other growth conditions.

Effect of the invention

According to the present invention, bean curd waste is used as the medium for cultivation of edible mushrooms so that effective utilization of resources, which could not be effectively utilized until now, can be realized.

Further, according to the present invention, artificial cultivation of edible mushrooms at a high yield can be realized by utilizing efficiently the highly nutritive ingredients of bean curd waste and an effect for making a great contribution to artificial cultivation of edible mushrooms on an industrial scale is obtained.

Application Examples of the invention

Next, the present invention is explained with Application Examples.

Application Example 1

Preparation of medium

(1) Preparation of dehydrated bean curd waste:

An acidic solution, which was obtained by lactic acid fermentation of 25 L whey solution (waste solution) formed in the bean curd production process at 38°C for 12 h, was added to 5 kg, bean curd waste (water content 84.9 wt%), and the mixture was press dehydrated to obtain 3.4 kg dehydrated bean curd waste with a water content of 78 wt% and pH of 4.2.

(2) Adjustment of medium

The dehydrated bean curd waste obtained in (1) was mixed with 722 g chaff, 85 g, calcium carbonate and 275 mL water to prepare a medium with a water content of 67 wt% and a

bean curd waste solids content of 51 wt%, based on the total solids content of the medium, for cultivation of mushrooms.

Cultivation of edible mushroom

550 g of the aforementioned medium were placed in an 850-mL polypropylene container and sterilized by wet heat at 120°C for 1.5 h after stoppering the container tightly. Then, agaricus spores were inoculated and cultivated at a specified cultivation condition.

The results are shown in Table 1.

Comparative Example 1

A medium was prepared in the same manner as that in Application Example 1 except that chaff was added to undehydrated bean curd waste to adjust the water content to 67 wt%, and agaricus was cultivated.

The results are shown in Table 1.

Table 1

	Cultivation days	Yield per bottle
Application Example 1	38-41 days	(average) 101 g
Comparative Example 1	51-53 days	(average) 87 g

As Table 1 shows, in the case of Application Example 1 of the present invention, the yield of young agaricus was increased as compared with Comparative Example 1, in addition the cultivation period was shortened, further the quality of the young agaricus produced was also superior.

Application Example 2

(1) Preparation of dehydrated bean curd waste:

An acidic solution, which was obtained by lactic acid fermentation of 15 L whey solution (waste solution) formed in the bean crud production process at 40°C for 10 h, was added to 5 kg bean curd waste (water content 84.9 wt%), and the mixture was press dehydrated to obtain 3 kg dehydrated bean curd waste with water content of 75 wt% and pH of 4.2.

(2) Adjustment of medium

The dehydrated bean curd waste obtained in (1) was mixed with 160 g pulverized rice straw and 85 g calcium carbonate to prepare a medium with a water content of 69.5 wt% and a

bean curd waste solids content of 76.7 wt%, based on the total solids content of the medium, for cultivation of edible mushrooms.

Cultivation of edible mushroom

In the same manner as that in Application Example 1, the medium was put in a container and sterilized by wet heat. After cultivating at 18-20°C and 70-75% relative humidity, spore were spread and cultivated in a growth chamber at 10-15°C and 90-95% relative humidity.

The results are shown in Table 2.

Comparative Example 2

Water was added to 5 parts saw dust and 1 part rice bran to prepare a medium with a water content of 69.5 wt%, and agaricus was cultivated in the same manner as that in Application Example 2.

The results are shown in Table 2.

Table 2

	Cultivation days	Yield per bottle
Application Example 2	30-32 days	(average) 118 g
Comparative Example 2	52-56 days	(average) 78 g

As Table shows 2, in the case of Application Example 2 of the present invention, the yield of young agaricus was increased as compared with Comparative Example 2, in addition the cultivation period was shortened, further the quality of the young agaricus produced was also superior.

Further, in the case of Application Example 2, the development of hyphae was fast, and the developed hyphae were actively propagated to turn the medium purely white. In the case of Comparative Example 2, however, the development of hyphae was slow, and the developed hyphae made the medium faintly white.

Application Example 3

(1) Preparation of dehydrated bean curd waste:

An acidic solution (pH 4.6), which was obtained by lactic acid fermentation of 20 L whey solution (waste solution) formed in the cheese production process at 35°C for 4 h, was added 5 kg to bean curd waste (water content 84.9 wt%), and the mixture was press dehydrated to obtain 3.77 kg dehydrated bean curd waste with water content of 80 wt% and pH of 5.5.

(2) Adjustment of medium

The dehydrated bean curd waste obtained in (1) was mixed with 500 g soybean husks and 333 g rice bran to prepare a medium with a water content of 67.1 wt% and a bean curd waste solids content of 50.0 wt%, based on the total solids content of the medium, for cultivation of edible mushrooms.

Cultivation of edible mushroom

Agaricus was cultivated by the same manner as that in Application Example 2.

The results are shown in Table 3.

Comparative Example 3

Water was added to 6 parts saw dust and 1 part rice bran to prepare a medium with a water content of 67 wt%, and agaricus was cultivated in the same manner as that in Application Example 3.

The results are shown in Table 3.

Table 3

	Cultivation days	Yield per bottle
Application Example 3	34-36 days	(average) 113 g
Comparative Example 3	52-56 days	(average) 77 g

As it Table shows 3, in the case of Application Example 3 of the present invention, the yield of young agaricus was increased as compared with Comparative Example 3, in addition the cultivation period was shortened, further the quality of the young agaricus produced was also superior.

Further, in the case of Application Example 3, the development of hyphae was fast, and the developed hyphae actively propagated to turn the medium purely white. In the case of Comparative Example 3, however, the development of hyphae was slow, and the developed hyphae made the medium faintly white.

Application Example 4

(1) Preparation of dehydrated bean curd waste:

An acidic solution containing 20 L 0.05% lactic acid was added to 5 kg bean curd waste (water content 84.9 wt%), and the mixture was press dehydrated to obtain 2.2 kg dehydrated bean curd waste with a water content of 66 wt% and pH of 3.6.

(2) Adjustment of medium

The dehydrated bean curd waste obtained in (1) was mixed with 18 g calcium carbonate and 2 g calcium hydroxide and the pH was adjusted to prepare a medium with a water content of 65.4 wt% and a bean curd waste solids content of 97.4 wt%, based on the total solids content of the medium, for cultivation of edible mushrooms.

Cultivation of edible mushroom

Agaricus was cultivated in the same manner as that in Application Example 2. Further cultivation of Comparative Example 4 was carried out using the medium of Comparative Example 2 as a comparison to Application Example 4.

The results are shown in Table 4.

Table 4

	Cultivation days	Yield per bottle
Application Example 3	34-36 days	(average) 113 g
Comparative Example 3	52-56 days	(average) 77 g

As Table 4 shows, in the case of Application Example 4 of the present invention, the yield of young agaricus was increased as compared with Comparative Example 4, in addition the cultivation period was shortened, further the quality of the young agaricus produced was also superior.

Further, in the case of Application Example 4, the development of hyphae was fast, and the developed hyphae actively propagated to turn the medium purely white. In the case of Comparative Example 4, however, the development of hyphae was slow, and the developed hyphae made the medium faintly white.